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AN EXPERIMENT CONCERNING TOWLINE KITING.(U)
SEP 65 S M RUPINSKI
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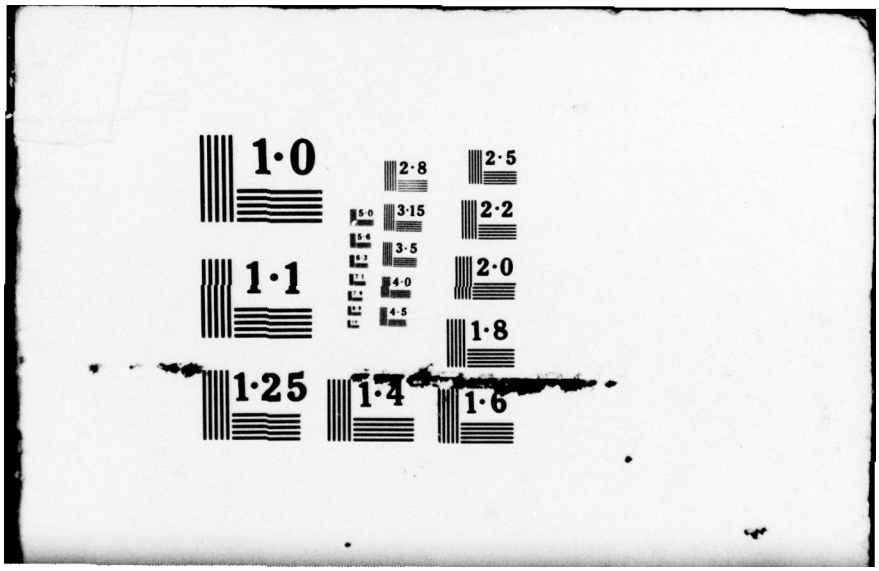
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U. S. Navy Underwater Sound Laboratory
Fort Trumbull, New London, Connecticut

(6) # AN EXPERIMENT CONCERNING TOWLINE KITING.

by

(10) S. M. Rupinski

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(11) 16 Sept 1965

(9) Technical memo.

INTRODUCTION

Towline kiting that can occur when bodies are towed from ships has been a problem for some time, especially on Fleet ships that have AN/SQA-10 variable depth sonar systems. Much effort has been and continues to be directed toward reducing or eliminating kiting. Reference (a) defines kiting and describes how to measure it.

The experiment that is the subject of this memorandum was conducted in order to explore a suggestion made by LT. Joseph M. Murphy, USN, Operations Officer of the USS WITEK. LT. Murphy suggested some time ago that kite could possible be reduced by first launching and lowering the VDS while the ship makes a turn.

The experiment described herein was for the purpose of investigating LT. Murphy's suggestion; it was performed at sea aboard the USS WITEK (DD-848) on 1 June 1965.

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VDS ON USS WITEK

The WITEK is equipped with an AN/SQA-11 VDS system. Its towline, like that of the AN/SQA-10, consists of an armored electrical cable and sectional complete fairing. The fairing shape is geometrically similar to, but larger than, the AN/SQA-10. Its thickness is 2-1/8 inches whereas the AN/SQA-10 fairing is 1-1/2 inches. The AN/SQA-11 outboard sheave is fixed on the centerline of the hoist, whereas the AN/SQA-10 outboard sheave translates athwartships during the inhaul and outhaul of the towline.

THE EXPERIMENT

The purpose of the experiment was to determine the effect on towline kiting, if any, of launching and lowering the VDS in a turn at a speed of 15 knots. It was hoped that this procedure would re-orient the towline fairing sections from their original orientations on the hoist drum and thereby change any kiting tendencies caused by the original fairing orientation.

First, the VDS was launched at a speed of 15 knots while the ship maintained a straight steady course. There was no appreciable wind during the test and the sea state was 0 to 1. The following data were taken:

Time (Local)	Ship Speed (turn count)	Rudder Angle	Cable Payed Out	Kite Angle	Remarks
1515	15 kts	0°	0 ft.	--	Began launching
1600	15	0°	500 ft.	20° port	
1603	20	0°	500 ft.	38° port	
1609	25	0°	500 ft.	65° port	
1612	15	0°	500 ft.	--	Began raising

The towline showed a large amount of kiting to port.

If it is assumed that the kiting was caused by fairing orientation, the fairing section headings must have been to port. In an attempt to correct the situation it seemed proper to stream the towline through a strong wake during a right turn. This was done using right standard rudder. The following data resulted:

Time (Local)	Ship Speed (turn count)	Rudder Angle	Cable Payed Out	Kite Angle	Remarks
1624	15 Kts	right 20°	0 ft.	--	Began launching
1635	15	0°	500 ft.	0°	
1640	20	0°	500 ft.	3° to 5° P	
1645	25	0°	500 ft.	3° to 10° P	
1650	15	0°	500 ft.		Began raising

It is obvious that the kiting situation had changed for the better.

Later, the towline was launched during a right turn using right full rudder. The resulting data are these:

Time (local)	Ship Speed (turn count)	Rudder Angle	Cable Payed out	Kite Angle	Remarks
1702	15 kt	Right 30°	0 ft.	--	Began launching
1718	15	0°	500 ft.	5°	
1725	20	0°	500 ft.	10° to 15°P	
1730	25	0°	500 ft.	15° to 20°P	
1735	15	0°	500 ft.	--	Began raising

The towline tended to kite more to port than it did before. It is noted that the speed of the ship with a 30° rudder is significantly reduced.

It was desirable to determine the effect of left turns on towline kiting. This was done, as shown below:

Time	Ship Speed (turn count)	Rudder Angle	Cable Payed out	Kite	Remarks
1747	15 kt	left 20°	0		
1800	15	0°	500 ft.	0° to 5° P	Began launching
1805	20	0°	500 ft.	0° to 5° P	
1808	25	0°	500 ft.	0°	
1840	15	0°	500 ft.		Began raising
1850	15	left 30°	0		Began launching
1904	15	0°	500 ft.	5° to 10°P	
1912	20	0°	500	25° P	
1915	25	0°	500	35° P	

Although the left 20° rudder reduced port kiting somewhat, use of left <u>full</u> rudder notably increased port kiting.

The towline was then <u>raised</u> during a right turn, using right standard rudder, and lowered as the ship followed a straight course.

Time (local)	Ship Speed (turn count)	Rudder Angle	Cable Payed out	Kite Angle	Remarks
1920	15 kt	right 20°	500 ft.		began raising
1928	15	0°	40 ft.		began launch
1937	15	0°	500 ft.	15° P	
1942	20	0°	500 ft.	30° P	
1947	25	0°	500 ft.	45° to 50°P	

It is seen that a retrieval in a right turn did nothing to improve a port kiting situation.

CONCLUSIONS

The data show that launching and lowering the WITEK's VDS in a turn at 15 knots have a noticeable effect on kiting. A discussion with Lt. Murphy revealed that this particular towline always kites to port if it kites at all.

It is believed that the kiting tendencies of this towline are largely due to fairing orientation induced by the hoist. If this is so launching in a right turn at speeds of 15 knots and greater should significantly reduce towline kiting. Since the ship slows down more at full rudder than at standard rudder, the use of standard rudder (20°) is considered to be superior to the use of full rudder (30°) for launching and lowering in an attempt to reduce kiting.

S. M. Rupinski

S. M. RUPINSKI
Mechanical Engineer

LIST OF REFERENCES

(a) D. A. Nichols, "Definition and Measurement of VDS Towline Kite Angles", USL Tech. Memo. No. 933-164-65, 24 Apr 1965 (Unclassified)

USL Tech. Memo.
No. 933-448-65

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